

Terr., III, 758 (1877); Tert. Ins. No. Am., 554, pl. 5, fig. 77 (1890). Maggot. White River. Eocene of Chagrin Valley, Colorado.

Length, 17 mm; width,  $4\frac{1}{2}$  mm. Stout subcylindric, venter with broad transverse micro spine bands best marked on fourth to ninth segments. Apparently exoristid or tachinid stock.

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### Notes on the Distribution of *Vermileo* in the United States and Mexico with a Description of a New Species. (Diptera: Rhagionidae).

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The genus *Vermileo*, or worm-lions as they are commonly called, includes a group of true flies of very remarkable habits. It seems, however, that both the latin name and the commonly used translated equivalent are misleading, for in habits they are not lion-like insects that feed on "worms" but "worms" or better maggots with the habit of preying on small arthropods that fall into their pits in the sand or dust. Their mode of life is quite similar to that of *Myrmelcon* which, as the name indicates, includes a group of predatory insects feeding chiefly on ants.

Wheeler<sup>1</sup> gives an account of the habits and distribution of all the known species of this genus and in addition a detailed study of the morphology of that common species of the Sierra Nevada Mountains, *V. comstocki* Wh. It was believed by Wheeler that this species was a mountain form and found only at elevations above 4000 feet. In April 1934 the writer reared specimens of this species from material collected in February in the Coast Range at Pinnacles National Monument at an elevation of about 1600 feet. The Pinnacles National Monument is near Hollister, California. On December 22, 1936, Ranger Powell of this monument sent in about a dozen more larvae from this locality. Three of these larvae pupated and transformed between February 2 and March 1, 1937.

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<sup>1</sup>Wheeler, W. M. Demons of the dust. W. W. Norton, New York, 1930.

*V. opacus* (Coq.) which is treated by Leonard<sup>2</sup> as a species distinct from *comstocki* and by Wheeler, in the work cited above, as but tentatively distinct was collected in the larval stage in numbers at Zion National Park, Utah in March 1934. Specimens reared from this lot were compared with the two specimens in the Academy of Natural Sciences, Philadelphia by Mr. Cresson who determined them as *V. opacus*. This species, which hitherto has been known only from a specimen collected near Carson City, Nevada and from two specimens from Alamogordo, New Mexico, was found to be very common in parts of the Southwest. In addition to the Utah locality, adults have been reared from larvae collected in Mesa Verde National Park, Colorado and Bandelier National Monument, New Mexico. Larvae that were most probably this species were collected at Colorado National Monument, Colorado and near Glendale, Utah. None has been collected in Arizona though they have been searched for from Grand Canyon in the north to the Chiricahua Mountains in the south.

*V. opacus* is easily distinguished from *comstocki* by its lighter color and its highly polished mesonotum with its three dark brown, sclerotized stripes.

During a trip to Mexico in 1936, *Vermileo* larvae were collected on January 25 at La Gruta near the pyramids of San Juan Teotihuacan at an elevation of about 8000 feet; on February 4 near the village of Palo Blanco, Go. at an elevation of about 2200 feet and on the same day at the same elevation two miles north of the town of Chiapanzingo, Guerrero. Both of these towns are on the highway to Acapulco. The last lot of larvae was collected on February 5 just south of the divide on the road between Mexico D. F. and Cuernavaca, Mor. at an elevation of about 9500 feet.

Of the several dozen larvae which were brought back alive to Berkeley only two have so far been reared to adults. Both of these larvae were from the lot collected February 5. At the time of collection these larvae were of all sizes but most of

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<sup>2</sup> Leonard, M. D. A revision of the dipterous family Rhagionidae in the United States and Canada. Amer. Ent. Soc. Mem. 7. Philadelphia, 1930.

them were about 16 mm in length. Many of the larger larvae were taken from pits no larger than pits from which larvae half their size were taken. The largest larvae, four of which pupated between April 13 and 23, 1936, did not increase in size before pupation. One of these pupae transformed between April 24 and 25. The remaining three pupae died. One more adult, a male, emerged between March 5 and July 2, 1937. The date of pupation for this specimen is not known.

At the time of writing this note (November 10, 1937), there are four larvae still alive. Three of these are from the lot collected from La Gruta and one from the lot collected near Palo Blanco.

The larvae have been fed chiefly on vestigial-winged *Drosophila* adults but they also accepted termite nymphs and adults, ants, and even *Lucilia* larvae. The ability of the larvae to go without food or moisture is rather remarkable. Although between April 26 and November 20, 1936 none of the larvae was fed, there was only a slight mortality. In fact mortality seemed to be greater during the period when they were regularly fed than when they were not fed. Another record of a long fast is that of a larva from Pinnacles National Monument which was not fed during the period between June 1934 and January 25, 1935 but which was apparently healthy when fed on the later date. Signs of cannibalism were observed in only one box where the larvae were rather perhaps too closely crowded. In attempts to secure pupation, the sand containing the larvae was heavily misted with water several times but the moistening of the sand apparently had no effect in hastening their development.

The two adults that were reared appear to be a new species. They are strikingly distinct from either of the two species in the United States and do not fit the description for *Arthrostylum* described by Williston from Mexico<sup>3</sup>. Williston in *Biologia Centrali-Americana*<sup>4</sup> lists his species as a synonym of Walker's *Pheneus tibialis* which was described from Jamaica.

<sup>3</sup> Williston, S. W. Kans. Uni. Quart. Vol. 4, p. 109. 1895. (*A fascipennis* n. sp.).

<sup>4</sup> Diptera Vol. 1, p. 264 of supplement. 1886-1901.

As pointed out by Wheeler (op. cit.), Williston's description of *fascipennis* does not fit the description for *tibialis*. His species is more closely allied to the new species described below.

**Vermileo willetti** n. sp.

*Male*.—Length, 8 mm with abdomen bent downward. If straightened out the length would be about 8.5 mm. Head: Front and face both grey-pollinose; eyes dichoptic, black, bare rather finely granular, inner margin of compound eyes along front nearly parallel up to vertex, ocelli set on a distinct prominence which is narrowed and shining behind and below, lateral ocelli closer to inner margin of compound eyes than the width of the anterior ocellus; antennae with first joint yellow, twice the length of the second which is slightly darker than the first, basal part of the third joint same color as the second, remainder of third joint and style dark brown, nearly black, the style becoming darker towards its extremity; occiput flat, same color as front and face, rather sparsely covered with slender, yellowish-brown bristles; mouthparts light yellow.

Thorax: Somewhat opaque; mesonotum brownish-yellow with three black, longitudinal stripes somewhat confluent posteriorly, the middle stripe undivided, extending to the anterior margin, the lateral stripes extending slightly more than three-fourths of the way to the anterior margin, area between stripes grey-pollinose; scutellum yellowish-brown, metanotum similar but with median part dark brown, this brown part wider posteriorly than anteriorly; meso- and sternopleura dark brown; basal part of pteropleura dark brown, remainder of pleura yellow-brown; pleura for the most part slightly pollinose.

Abdomen: Slender, narrowest at segments 4 and 5, shining, yellowish brown with caudal half of segments 2 to 6 black, segment 7 entirely black, the remaining segment and appendages opaque brown, segment 1 black along crescent-shaped posteriorly bent transverse ridge, segment 2 with rounded boss near dorsal caudal margin, segment 3 with less strongly pronounced boss in the same relative position.

Wings: Hyaline with infumated band extending from C at union of Sc with C more narrowly across wing to and along  $Cu_2$  to wing margin; all of cells  $C_2$  and Sc infumated but not as strongly as transverse band; tip of wing infumated in region of  $R_{2+3}$  and  $R_4$  and  $R_5$ ; cell  $M_1$  acute at base, cell  $M_3$  open; knobs of halteres and distal half of stem nearly black.

Legs: Fore-legs yellow, last four segments of tarsi dark, 1st tarsal segment intermediate in color; a single spur present at

distal end of tibia; mesothoracic legs similar to fore-legs but darker in color and two spurs at end of tibia; metathoracic legs much longer than others and darker, tibia nearly black except for extreme proximal end of which is yellowish, two spurs at distal end of tibia.

Described from one specimen reared from larva collected February 5, 1936 along the highway about halfway between Mexico D. F. and Cuernavaca, Morelos. Emerged between March 5 and July 2, 1937.

*Female*.—Length 7 mm, the abdomen is bent down rather strongly; if straightened out the length would be at least 8 mm; similar to male but more robust and coloration uniformly lighter; inner margin of compound eyes along front more distinctly divergent towards the apex, lateral ocelli scarcely more distant from inner margin of compound eyes than the width of the anterior ocellus; mesothorax with longitudinal stripes wider, sides parallel and no tendency towards posterior confluency, lateral stripes lighter in color than median stripe; metanotum without darker median area; abdomen robust, dark yellow-brown, segments scarcely lighter anteriorly; hind tarsi and distal end of tibiae yellow; infumation of wings similar to but not as pronounced as in male.

Described from one female collected as larva same date and locality as male but which emerged between April 24 and 25, 1936. The tip of the right wing is broken.

*Type*: Male; both type and allotype are being retained in the author's collection under the collection number 680.

Named after C. R. Willette of Yosemite National Park who first found the pits of this species.

This species seems to be allied to *V. fascipennis* (Will.) but differs from it by the front and face being grey-pollinose whereas the front of *fascipennis* is brown and the face opaque yellow; by the first two joints of the antennae being yellow, while in *fascipennis* they both are partly black; by the pleura being yellow-brown instead of black; and by the abdomen having five transverse yellowish bands instead of being reddish and without any bands.

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